HHS Public Access

Author manuscript

Breast Cancer Res Treat. Author manuscript; available in PMC 2017 July 17.

Published in final edited form as:

Breast Cancer Res Treat. 2012 July ; 134(2): 867–874. doi:10.1007/s10549-012-2116-3.

The Influence of Non-Clinical Patient Factors on Medical Oncologists' Decisions to Recommend Breast Cancer Adjuvant Chemotherapy

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Abstract

BACKGROUND—The extent to which medical oncologists consider non-clinical patient factors when deciding to recommend adjuvant chemotherapy is unknown.

METHODS—Medical oncologists who treated a population-based sample of early-stage breast cancer patients reported to the Los Angeles and Detroit Surveillance, Epidemiology, and End Results registries 2005–2007 were asked how strongly they consider a patient's ability to follow instructions, level of social support, and level of work support/flexibility in decisions to recommend adjuvant chemotherapy. Responses of 4 (Quite strongly) or 5 (Very strongly) on a 5-point Likert scale defined strong consideration. Associations between oncologist/practice characteristics and strong consideration of each non-clinical factor were examined.

RESULTS—134 oncologists (66%) reported strong consideration of one or more factor. Ability to follow instructions was strongly considered by 120 oncologists (59%), social support by 78

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Conflict of interest

The authors declare that they have no conflict of interest.

(38%), and work support/flexibility by 73 (36%). Larger percent of practice devoted to breast cancer was associated with lower likelihood of strongly considering ability to follow instructions [odds ratio (OR) 0.98, 95% confidence interval (CI) 0.97–0.99; P=0.04]. Increased years in practice was associated with lower likelihood of strongly considering social support (OR 0.96, CI 0.93–0.99; P=0.011), while non-white race (OR 2.1, CI 1.03–4.26; P=0.041) and tumor board access (OR 2.04, CI 1.01–4.12; P=0.048) were associated with higher likelihood. Non-white race was associated with strongly considering work support/flexibility (OR 2.44, CI 1.21–4.92; P=0.013). Tumor board access (OR 2, CI 1.00–4.02; P=0.051) was borderline significant.

CONCLUSIONS—Non-clinical patient factors play a role in medical oncologist decision-making for breast cancer adjuvant chemotherapy recommendations.

Keywords

decision making; breast cancer; chemotherapy; social environment; socioeconomic factors

Introduction

Oncologist recommendations for adjuvant chemotherapy for patients with breast cancer are based on numerous factors, including patient clinical factors and tumor characteristics. In breast cancer patients with a high risk of recurrence by virtue of stage or tumor biology, guidelines recommend treatment with adjuvant chemotherapy in the absence of substantial patient comorbidity [1]. For patients with a lower risk of recurrence and a corresponding lower marginal benefit of adjuvant chemotherapy [2,3], factors such as patient preferences and physician beliefs about the benefit of chemotherapy enter into the treatment decision [4–6].

It is not known to what extent non-clinical patient factors play a role in medical oncologists' recommendations regarding chemotherapy. In other medical conditions, including diabetes and cardiovascular disease, factors such as presence of social support, heavy career and family demands, a patient’s desire for an active lifestyle, and perceived patient education level have been shown to influence physician treatment recommendations [7–9]. Primary care providers have reported that patient socioeconomic status affects their clinical management decisions including diagnostic testing, medication prescription, and referrals to subspecialists [5,10]. In other work, social, behavioral, and psychological patient characteristics influence physician decision to recommend initiation of protease inhibitor triple combination regimens for the treatment of HIV/AIDS [11]. In some of these clinical settings, physician demographic characteristics, including sex and race, have been associated with the tendency to consider these non-clinical factors [6].

The purpose of this study was to investigate the extent to which medical oncologists consider non-clinical patient factors (ability to follow instructions, level of social support, and level of support and flexibility at work) in their decisions to recommend adjuvant chemotherapy for breast cancer. These three factors were chosen because of the potential of each to affect the successful delivery of a complete course of adjuvant chemotherapy. As described in greater detail below in Methods, we hypothesized that physician and practice

characteristics would be associated with the degree to which medical oncologists consider each non-clinical factor.

Methods

Study Sample and Data Collection

Medical oncologists who treated a population-based sample of patients diagnosed with early-stage invasive breast cancer in the Los Angeles and Detroit Surveillance, Epidemiology, and End Results (SEER) registries were invited to complete a survey. Details of the patient survey have been previously published [12,13]. The patient survey was administered to patients diagnosed between 2005 and 2007, approximately 9 months after diagnosis. Patient participants were asked to identify their medical oncologist. The oncologist sample was augmented by identifying additional medical oncologists through the Los Angeles County Cancer Surveillance Program (n = 43). The oncologists were mailed a letter of introduction, survey, and $40 gift incentive. A modified version of the Dillman method was used to optimize response rate. Follow-up of non-respondents included a postcard reminder and then a telephone reminder [14].

The Institutional Review Boards of the University of Michigan, University of Southern California, and Wayne State University approved all study procedures.

Measures

The measures used in this analysis were obtained from the medical oncologist survey.

Dependent variables—On a 5-point Likert scale (“not at all” to “very strongly”), oncologists were asked to rate how strongly they consider the following non-clinical patient factors when deciding whether or not to recommend adjuvant chemotherapy to patients with breast cancer: (1) ability to follow instructions, (2) level of social support, and (3) level of support and flexibility at work. Non-clinical factors were defined as being “strongly considered” if the oncologists indicated 4 (quite strongly) or 5 (very strongly) on the Likert scale. Responses of 1 to 3 were categorized as “not strongly considered.”

Independent variables—Oncologist characteristics included years in practice, percent of practice devoted to breast cancer, and percent of patients with Medicaid (continuous variables), and sex, race, nights per week personally on-call, and frequency of evaluation of patients during chemotherapy (categorical variables). Response options for race included white, African-American, American Indian or Alaska native, Asian or Pacific Islander, and other, and was categorized as “white” versus “other” because of the small number of oncologists in each of the non-white groups. Responses for frequency of evaluation of patients during chemotherapy included before each cycle, before most cycles, before some cycles, and only before the first and after the last cycle, and was categorized as before each cycle versus other. For nights per week personally on-call, oncologists responded less than one night, one night, two to three nights, or four or more nights. This variable was categorized as one night or less versus two or more. Practice characteristics (yes/no) included availability of social workers and/or psychologists, university affiliation,

availability of nurse practitioners and/or physician assistants to see patients during chemotherapy, access to a tumor board, feedback to clinicians about meeting clinical management standards, and participation in a regional and/or national network to examine variations in treatment.

Because of the potential for higher perceived work burden for the oncologist to respond to and treat side effects were they to develop, we hypothesized that more nights personally on-call, higher frequency of evaluation of patients during the course of chemotherapy treatment, lack of social workers and/or psychologists and nurse practitioners and/or physician assistants, and a larger percent of patients being seen in the practice with Medicaid insurance would be associated with strong consideration of non-clinical patient factors. We hypothesized that access to tumor board conferences would also be associated with strong consideration. Tumor boards are typically attended by a variety of healthcare providers, including medical, surgical, and radiation oncologists, social workers, psychologists, and genetic counselors. Many tumor boards are held before medical oncologists meet patients for an initial consultation, and may heighten provider awareness of non-clinical patient factors that could affect the course of chemotherapy delivery. Conversely, we hypothesized that more years in practice and a larger percent of practice devoted to breast cancer (reflecting specialization and greater degree of confidence in ability to manage treatment toxicities), and feedback regarding management standards and participation in a network to examine treatment variation (providing clearly defined treatment guidelines), would decrease the impact of non-clinical factors on treatment recommendations.

Statistical Analyses

We calculated the percent of medical oncologists who strongly considered each of the non-clinical patient factors (ability to follow instructions, level of social support, level of work support and flexibility) separately. We also created a variable reflecting the count (0 to 3) of the total number of non-clinical patient factors strongly considered by each oncologist, and we calculated the percent of oncologists who considered 0, 1, 2 or 3 non-clinical factors. Respondents who did not answer all three of the dependent variable questions (n = 2) were excluded from these analyses.

For each of the three non-clinical patient factors, we performed separate bivariate analyses to compare oncologist and practice characteristics between those oncologists who reported strong consideration of each factor and those who did not. Two-sided t-tests were used to compare continuous variables, and Pearson chi-squared tests were used to compare categorical variables. Due to missing data, one oncologist was excluded from the ability to follow instructions analyses, and one oncologist was excluded from the work support and flexibility analyses.

We defined three multivariate logistic regression models to investigate associations between the oncologist and practice characteristics and strong consideration of each of the three non-clinical patient factors. Each model included only those oncologist and practice factors determined to be significant at a P-value of less than 0.25 in the bivariate analyses [15]. All three models controlled for sex, race, years in practice, and percent of patients with Medicaid. We also controlled for availability of social worker(s) or psychologist(s) in the

two models that examined associations with level of social support and level of work support and flexibility. Rates of missing variables ranged from 0 to 9%. Oncologists for whom we were missing independent variables were excluded from the analytic samples. Among the three models, up to 16.6% of the oncologists were excluded. Therefore, sensitivity analyses were conducted where missing values were multiply imputed to correct for potential missing data bias. Estimates and their variances from the multiple imputation results were combined according to the Rubin method [16].

Statistical significance was defined at a type I error rate of less than 5%. STATA/SE 11 (StataCorp LP, College Station, TX) was used for all statistical analyses.

Results

Description of oncologist sample

A total of 262 medical oncologists were identified by the patient respondents. Of these oncologists, 180 (69%) completed the survey. An additional 43 medical oncologists were identified through the Los Angeles County Cancer Surveillance Program, and 26 (60%) of these completed the survey. In total, 206 oncologists completed the survey (combined response rate of 67.5%). One oncologist indicated that s/he did not see any breast cancer patients and was excluded.

Table 1 shows the characteristics of the 205 oncologists. Respondents reported having a median of 30% of their practice devoted to breast cancer patients, and five (3%) of the oncologists had a practice devoted to exclusively to breast cancer patients. The estimated percent of patients with Medicaid insurance in the oncologists' practices varied from 0% to 70% with a median of 10%. Approximately one-half of the oncologists reported having a nurse practitioner and/or physician assistant who evaluate patients during chemotherapy (54%), but most did not have a social worker and/or psychologist available to see patients (80%). Over half of the oncologists (58%) reported receiving feedback regarding meeting clinical management standards; fewer (44%) worked in practices that participate in a regional and/or national network to examine treatment variations.

Outcome measures

Overall, 134 oncologists (66% of 203) reported strong consideration of one or more non-clinical factor when deciding to recommend adjuvant chemotherapy for breast cancer. One hundred twenty oncologists (59%) strongly consider a patient's ability to follow instructions, 78 (38%) strongly consider patient level of social support, and 73 (36%) strongly consider patient level of support and flexibility at work (Figure 1). Responses were not mutually exclusive.

In aggregate, oncologists reported strongly considering a median of one non-clinical patient factor, with a range of none to all three. Forty-eight oncologists (24%) indicated that they strongly consider all three of the non-clinical factors. Of the remaining oncologists, 39 (19%) indicated strong consideration of two of the non-clinical factors, 47 (23%) indicated strong consideration of one, and 69 oncologists (34%) reported none (Figure 2).

Bivariate Analyses

Among oncologists reporting strong consideration of level of social support as compared to those who did not, the average number of years in practice was lower (16.3 years versus 20.6, P = 0.009) and a larger percent reported access to tumor board (62% versus 55%, P=0.045). Among oncologists reporting strong consideration of level of work support and flexibility, there was a higher percent who reported receiving feedback about meeting clinical management standards (67% versus 53%, P=0.045) and access to tumor board (73% versus 53%, P=0.007). There was a higher proportion of oncologists of non-white race among those reporting strong consideration of level of social support (49% versus 31%, P=0.006) as well as among those reporting strong consideration of level of work support and flexibility (50% versus 32%, P=0.022). All other bivariate comparisons were not statistically significant.

Multivariate Analyses

Results from the three multivariate models investigating associations between oncologist and practice characteristics and strong consideration of each of the three non-clinical patient factors are presented in Table 2. In the first model, a patient's ability to follow instructions was less likely to be strongly considered amongst the oncologists with a larger percentage of their practice devoted to breast cancer (OR 0.98, 95% CI 0.97–0.99; P=0.04). The second model demonstrated that level of social support was less likely to be strongly considered by oncologists with more years in practice (OR 0.96, 95% CI 0.93–0.99; P=0.011), and more likely to be strongly considered by oncologists who were of non-white race (OR 2.1, 95% CI 1.03–4.26; P=0.041) and those with access to a tumor board (OR 2.04, 95% CI 1.01–4.12; P=0.048). In the third model, level of work support and flexibility was more likely to be strongly considered by non-white oncologists (OR 2.44, 95% CI 1.21–4.92; P=0.013). Access to a tumor board was borderline significant in this model (OR 2, 95% CI 1.00–4.02; P=0.051). In all three models, none of the other oncologist or practice characteristics included were associated with strong consideration of the non-clinical patient factors.

Sensitivity Analyses

Analyses with and without multiple imputation (MI) yielded generally consistent findings except for a few small changes in associations. In the model investigating factors associated with strong consideration of level of work support and flexibility, the effect of access to tumor board became larger and statistically significant (without MI OR = 2, 95% CI 1.00–4.02, P = 0.051; with MI OR = 2.75, 95% CI 1.31–4.88, P = 0.006) and the effect of non-white race became smaller and less statistically significant (without MI OR = 2.44, 95% CI 1.21–4.92, P = 0.013; with MI OR = 1.83, 95% CI 0.96–3.58, P = 0.068).

Discussion

In summary, we found that medical oncologists frequently report consideration of non-clinical patient factors in their decisions to recommend breast cancer adjuvant chemotherapy, with two-thirds of oncologists reporting strong consideration of one or more non-clinical factor. Oncologists reported strong consideration of a patient's ability to follow instructions at a higher frequency than level of support. This may be due to a perception that

ability to follow instructions has a greater direct impact on the successful delivery of a course of adjuvant chemotherapy than the patient's support environment. Alternatively, oncologists may place more emphasis on ability to follow instructions because they have greater confidence in being able to accurately assess this as compared to a patient's social environment.

The associations between years in practice and consideration of a patient's ability to follow instructions, and extent of specialization in breast cancer and consideration of level of social support, may be the result of greater physician experience and confidence in his/her ability to support the patient through chemotherapy treatment regardless of these non-clinical patient factors. Our finding that physicians with more experience are less likely to incorporate these non-clinical factors may partly explain previous research on the relationship between years in practice and patient outcomes [17,18].

The association between tumor board availability and strong consideration of social support and work support and flexibility may be related to an enhanced awareness of social vulnerability of patients. In clinical vignette studies, social vulnerability has been shown to play a role in treatment recommendation decision-making. For example, in one study, black men and those who were former injection drug users were rated by physicians as less likely to adhere to highly active antiretroviral therapy (HAART) for HIV. This perception was associated with a lower likelihood that the responding physician would prescribe HAART [19]. In another study using written vignettes describing patients with prostate cancer, urologists were less likely to recommend a radical prostatectomy to patients who were described as low-income and widowed compared to those who were middle-income and married [20]. Multidisciplinary tumor boards are a forum in which multiple providers describe patient cases, often including descriptions of behavioral and social issues. Discussions about patients' financial and social challenges before a medical oncologist meets a patient may heighten awareness of issues that are perceived as impacting whether or not a patient will actively seek supportive care during chemotherapy.

Although we observed an association between non-white oncologist race and greater likelihood of strongly considering level of social support and level of work support and flexibility, the non-white race group was heterogeneous. Further work investigating the relationship between physician race and the role that non-clinical patient factors play in decisions to recommend adjuvant chemotherapy for breast cancer treatment may be warranted.

Our findings could be interpreted as evidence that medical oncologists are providing patient-centered care. According to the Institute of Medicine, provision of patient-centered care requires that physicians must know the patient as a whole person, including the social circumstances and ability to follow instructions [21]. However, in order for patient-centered care to result in desirable outcomes, the physician assessment of these non-clinical factors and the impact these non-clinical factors will have on treatment delivery must be accurate. The issue is further complicated because decisions to recommend adjuvant chemotherapy are, by definition, made under conditions of uncertainty since the degree of benefit achieved in an individual patient is uncertain [22]. Therefore, consideration of non-clinical patient

factors could incorrectly result in adjuvant chemotherapy not being recommended in patients with a higher risk of recurrence for whom treatment offers greater benefit.

This study has several limitations. First, a limited number of medical oncologists in only two areas of the country were surveyed. Respondents may not be representative of all the medical oncologists in the Detroit and Los Angeles SEER catchment areas. Second, it is possible that the degree of consideration of non-clinical factors was overestimated because medical oncologists felt that to consider non-clinical patient factors is the socially desirable response. Third, we do not know whether oncologists' survey responses correspond to their actual practice patterns. Finally, the analyses were not specifically powered to detect significant associations for all of the medical oncologist and practice characteristics being investigated. Thus, caution should be exercised when interpreting the non-significant findings.

The rates of missing data differed across gender, race and participation in a practice network to examine treatment variation. To reduce potential missing data bias, we performed multiple imputation on the missing values [23]. This allowed us to include all 204 oncologists in our analyses to gain efficiency and be able to generalize the conclusions to the original sample population. The multiple imputation results are similar to the analyses limited to oncologists with complete data. Although the association between access to a tumor board and non-white race with level of work support and flexibility change slightly after imputation, the directions of all associations were consistent with and without multiple imputation, and both factors remain significantly associated with strong consideration of support and flexibility at work.

Quality of care is affected by errors of omission that result from failure to provide indicated treatments [24]. Consideration of non-clinical patient factors may increase errors of omission due to inaccurate assessment of a patient's true social context and incorporation of these non-clinical patient factors into decisions whether or not to recommend adjuvant chemotherapy treatment in cases where they should not be considered. Decisions made by medical oncologists to recommend adjuvant chemotherapy are not made over time. Rather, they are made after one or, at most, two patient-provider encounters. Decisions that incorporate non-clinical factors after few meetings with the patient are prone to error. In a study of simulated first-encounter primary care office visits, 88% of the physicians made what are referred to as "contextual errors" in which they did not adequately assess a patient's environment or behavior (context) when faced with complicated scenarios [25]. Furthermore, tumor boards provide the opportunity for medical oncologists to be primed with potentially inaccurate information about a patient's social situation even prior to meeting the patient. Therefore, in the setting of adjuvant chemotherapy decision-making, errors in assessment of a patient's context may significantly increase the risk of omission of important therapy. The use of assessment tools to identify patients who have problems following instructions, and those with minimal support, may increase the accuracy of oncologists' knowledge of a patient's social context. Incorporating tools such as these into a healthcare system in which individual providers and practices are prepared to meet the needs of patients whom providers perceive to be at risk during chemotherapy will improve the quality of cancer care.

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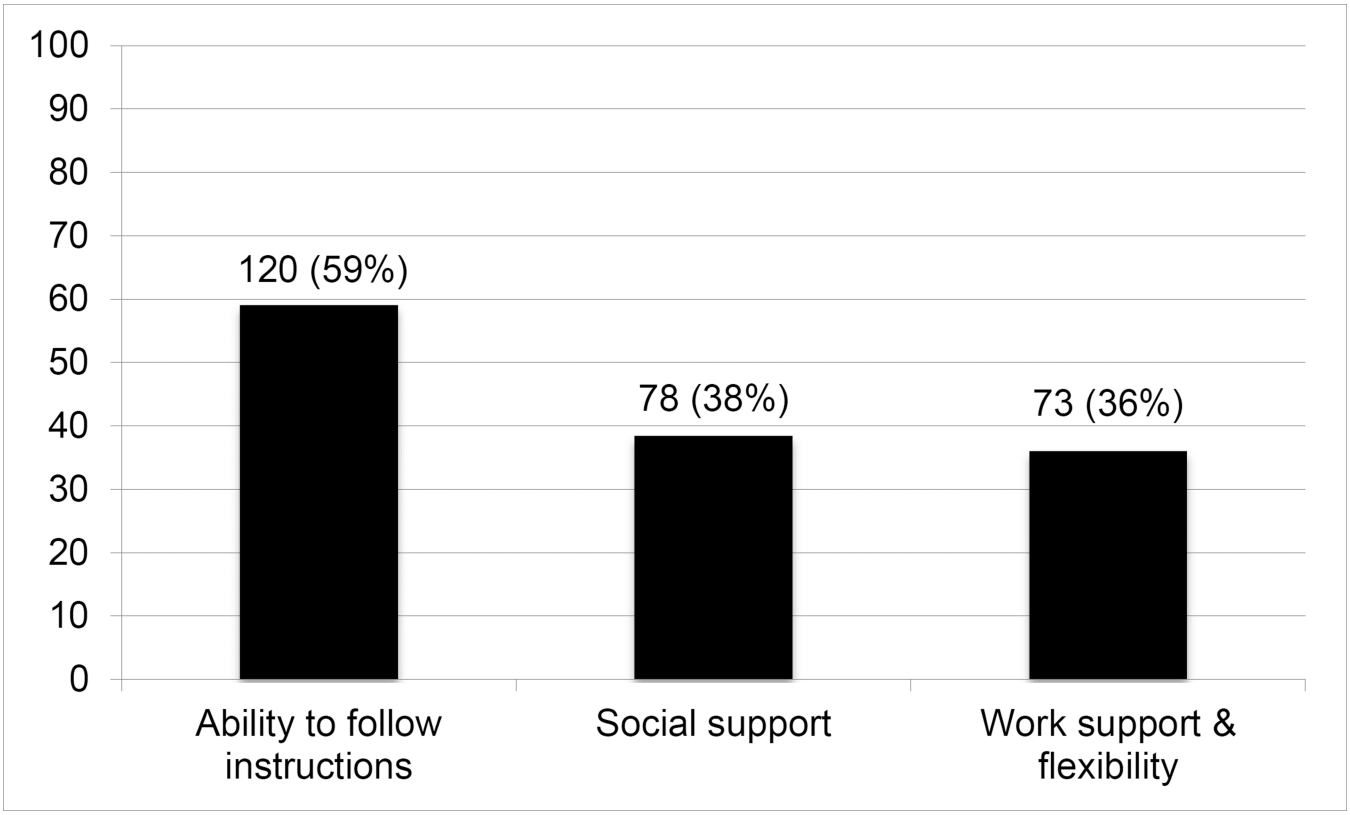

Figure 1.
Percent of oncologists reporting strong consideration of non-clinical patient factors* (N = 203)
*Not mutually exclusive

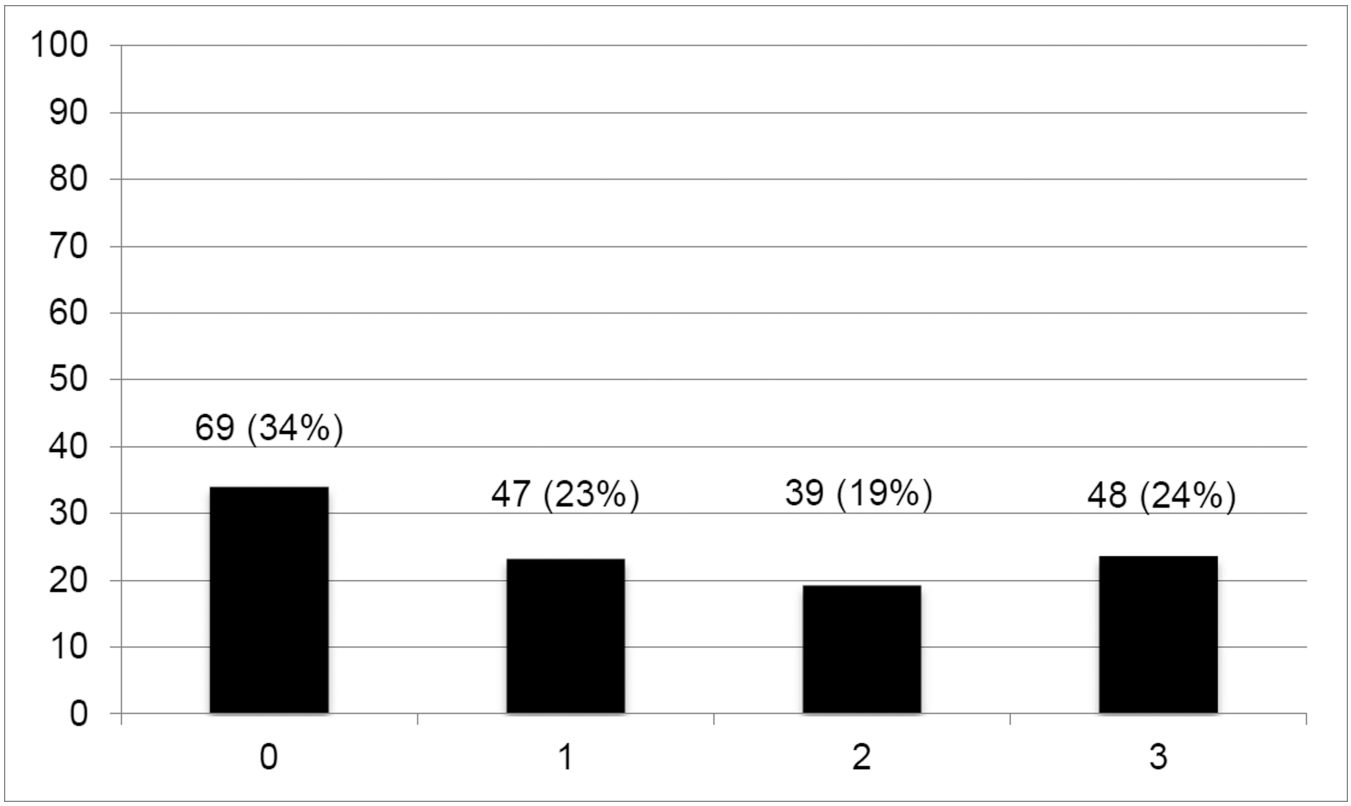

Figure 2.
Percent of medical oncologists by count of total number of non-clinical patient factors strongly considered (N = 203)

Table 1

Medical oncologist respondent characteristics (N = 205)

Characteristic		
	Median	**Range**
Years in practice	20	1 – 51
% of practice devoted to breast cancer	30	1 – 100
% of patients Medicaid	10	0 – 80
	No.	%
Sex		
Male	152	74.1
Female	50	24.4
Missing	3	1.5
Race/Ethnicity		
White	120	58.5
Other	77	37.6
Missing	8	3.9
Nights per week personally on-call		
One or less	82	40.0
Two or more	123	60.0
Frequency of evaluation of patients during chemotherapy		
Less than prior to each cycle	63	29.3
Prior to each cycle	143	69.8
Missing	2	0.9
Availability of social workers and/or psychologists		
No	163	79.5
Yes	42	20.5
University affiliation		
No	136	66.3
Yes	68	33.2
Missing	1	0.5
Availability of nurse practitioners and/or physician assistants		
No	95	46.3
Yes	110	53.7
Access to a tumor board		
No	81	39.5
Yes	124	60.5

Characteristic		
	Median	**Range**
Feedback to clinicians about meeting clinical management standards		
No	86	41.9
Yes	119	58.1
Participation in a regional and/or national network to examine treatment variations		
No	111	54.1
Yes	90	43.9
Missing	4	1.9

Table 2

Oncologist and practice characteristics associated with strong consideration of non-clinical patient factors in multivariate regression models

	Non-clinical patient factors								
	Ability to follow instructions (N = 174)			Level of work support (N = 171)			Level of social support and flexibility (N = 171)		
Characteristic	**OR**	**95% CI**	**P**	**OR**	**95% CI**	**P**	**OR**	**95% CI**	**P**
Years in practice[‡]	0.98	0.95–1.01	.16	**0.96**	**0.93–0.99**	**.011**	0.99	0.96–1.02	0.54
% of practice devoted to breast cancer[†]	**0.98**	**0.97–0.99**	**.04**	0.99	0.97–1.01	.35			
% of patients Medicaid[†]	0.99	0.97–1.01	.41	0.99	0.96–1.01	.25	0.99	0.97–1.02	.67
Sex: male v female	1.56	0.65–2.28	.32	0.62	0.24–1.59	.32	0.92	0.39–2.16	.85
Race/ethnicity: white vs. other	1.05	0.54–2.06	.89	**2.03**	**1.03–4.26**	**.041**	**2.44**	**1.21–4.92**	**.013**
Nights personally on-call: 1 or less per week vs. more				1.14	0.55–2.35	.36	1.31	0.64–2.71	.45
Availablity of social worker and/or psychologist: no vs. yes				1.03	0.43–2.42	.95	0.98	0.41–2.33	.96
Availability of nurse practitioners and/or physician assistants: no vs. yes	1.20	0.63–2.28	.57				1.94	0.96–3.93	.07
Access to a tumor board: no vs. yes	1.37	0.73–2.59	.34	**2.03**	**1.01–4.12**	**.048**	**2.00**	**1.00–4.02**	**.051**
Feedback to clinicians about meeting clinical management standards: no vs. yes							0.66	0.31–1.39	.27
Participation in a regional and/or national network to examine treatment variations: no vs. yes				0.8	0.41–1.57	.51	0.55	0.26–1.17	.12

Abbreviations: odds ratio (OR), 95% confidence interval (CI)

[‡]For each 1 year increase in number of years in practice

[†]For each 1% increase in percent of practice devoted to breast cancer